David Durst

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Seeking research engineer roles where I can build data systems to collect large human behavior datasets and deploy ML models that imitate and analyze the data.

EDUCATION

Stanford University, Stanford, CA — Sep 2017 – Aug 2024 (Expected)
Degrees: Ph.D. in Computer Science (2024 Expected); M.S. in Computer Science (2021) — GPA: 4.00
Dissertation: Efficiently Imitating Human Movement in Counter-Strike
Advisors: Kayvon Fatahalian, Pat Hanrahan

Princeton University, Princeton, NJ — Sep 2011 – Jun 2015
Degree: B.S.E. in Computer Science with Certificate (Minor) in Finance, *summa cum laude* — GPA: 3.95
Advisors: Mark Braverman, Kai Li

ACADEMIC RESEARCH

Efficiently Imitating Human Movement in Counter-Strike — Sep 2020 – Present
Advisors: Kayvon Fatahalian and Pat Hanrahan
github.com/David-Durst/csknow, davidbdurst.com/blog/

- Analyze human behavior traces and train model to imitate humans
- Train transformer-based learned movement controller in AI performance constraints of a commercial video game
- Curate 123-hour dataset of expert human movement
- Design and execute user study demonstrating learned movement model best imitates humans
- Create quantitative metrics evaluating similarity to human behavior distribution

Aetherling: Type-Directed Scheduling of Streaming Accelerators — Jan 2018 – Apr 2021
Advisors: Kayvon Fatahalian, Pat Hanrahan, and Marco Patrignani
aetherling.org

- Created languages: express image processing applications that compile to statically scheduled, streaming hardware accelerators
- Developed space-time type system: express trade-offs between throughput and resource utilization
- Implemented auto-scheduling compiler: trade-off throughput and resources while preserving semantics with type-directed rewrite rules
- Generated FPGA designs: use fewer resources than designs created by comparable systems

SELECT RESEARCH PROJECTS

Revisiting Structure vs. Learning — 2023
davidbdurst.com/blog/csknow_revisiting_structure_vs_learning_tradeoff.html
Narrowly defined bot behavior components fail to capture the full complexity of human behavior

A Hand-Crafted Structure for Imitation Learning — 2022
davidbdurst.com/blog/csknow_behavior_tree_bots_0_1.html
A structure for bots that imitates human behavior to enable an understanding of human behavior

Computing Good Crosshair Placements Using RLpbr's GPU Ray Tracing — 2021
davidbdurst.com/blog/csknow_cover_edge.html
Compute analytics for where humans are likely to look based on map geometry

PUBLICATIONS PREPRINT AND INDUSTRY WHITE PAPER

Final Research Paper – Under Submission
Durst et al.
This preprint is under submission and is available upon request

Hallucinations: Baiting Cheaters Into Self-Identifying by Reversing Detection
Durst, Taylor
activision.com/cdn/research/hallucinations 2023

Type-Directed Scheduling of Streaming Accelerators
Durst, Feldman, Huff, Akeley, Daly, Bernstein, Patrignani, Fatahalian, Hanrahan
Programming Language Design and Implementation (PLDI) 2020

AHA: An Agile Approach to the Design of Coarse-Grained Reconfigurable Accelerators and Compilers
Koul, Melchert, Sreedhar, Truong, Nyengele, Zhang, Liu, Setter, Chen, Mei, Strange, Daly, Donovick, Carsello, Kong, Feng, Huff, Nayak, Setaluri, Thomas, Bhagdikar, **Durst**, Myers, Tsiskaridze, Richardson, Bahr, Fatahalian, Hanrahan, Barrett, Horowitz, Torng, Kjolstad, Raina
ACM Transactions on Embedded Computing Systems (TECS) 2023

Creating an Agile Hardware Design Flow
Bahr, Barrett, Bhagdikar, Carsello, Daly, Donovick, **Durst**, Fatahalian, Feng, Hanrahan, Hofstee, Horowitz, Huff, Kjolstad, Kong, Liu, Mann, Melchert, Nayak, Niemetz, Nyengele, Raina, Richardson, Setaluri, Setter, Sreedhar, Strange, Thomas, Torng, Truong, Tsiskaridze, Zhang
Design Automation Conference (DAC) 2020

PRESENTATIONS

Hallucinations: Baiting Cheaters Into Self-Identifying by Reversing Detection, March 2023
Game Developers Conference (GDC) 2023 – Online Game Technology Summit

Aetherling: Type-Directed Scheduling of Streaming Accelerators, PLDI June 2020
youtu.be/hsFMzMnbugk

TopNotch: Systematically Quality Controlling Big Data, Spark Summit East Feb 2016
youtu.be/PViAlNQ1q5s

PROFESSIONAL ACTIVITIES

The First Workshop on Computer Vision for Video Games (CV^2) Fall 2024
Program Cmte Member, European Conference on Computer Vision

Workshop on Languages, Tools, and Techniques for Accelerator Design (LATTE) 2021 Spring 2021
Program Cmte Member, Architectural Support for Programming Languages and Operating Systems

TEACHING EXPERIENCE

CS 348K: Visual Computing Systems, Stanford University Spring 2021
Course Assistant

CS 149: Parallel Computing, Stanford University Fall 2020
Course Assistant

COS 318: Operating Systems, Princeton University Fall 2013
Teaching Assistant

WORK EXPERIENCE

Activision Blizzard, Inc., Remote June 2021 – June 2022
Student Associate, Global Analytics
- Deployed behavioral anti-cheat feature to production Call of Duty game
- Modeled player churn using survival analysis techniques

Adobe Inc., Remote June 2020 – September 2020
Creative Technologies Lab Intern
- Prototyped Halide-to-FPGA compilation toolchain, modeled performance on FPGAs, CPUs, GPUs, and DSPs

BlackRock, Inc., New York, NY Summer 2014, Aug 2015 – Jun 2017
Financial Modeling Group Intern & Analyst
- Modeled mortgage-backed securities for portfolio managers using loan level data sets and Spark

Bridgewater Associates, LP, Westport, CT Summer 2013
Technical Associate Intern, Research Technology

SELECT SKILLS

Python (PyTorch, NumPy, etc.), TypeScript, C, C++, Haskell, Java, Scala, Spark, Linux, Databases, Cloud Computing, Chisel, Magma

AWARDS HONORS ACTIVITIES

National Science Foundation Graduate Research Fellowship Fall 2017 – Summer 2022
Stanford Graduate Fellowship in Science & Engineering Fall 2017 – Summer 2022
Phi Beta Kappa (early induction for 27 members of graduating class) Fall 2014
Mentor, Stanford Undergraduate Research Association Winter 2020 – Spring 2023
Code/Interactive, a Code.org Partner, Mentor NYC High School Students Fall 2015 – Spring 2017